

RotCFD: A Viscous Design Tool for Advanced Configurations, Phase I

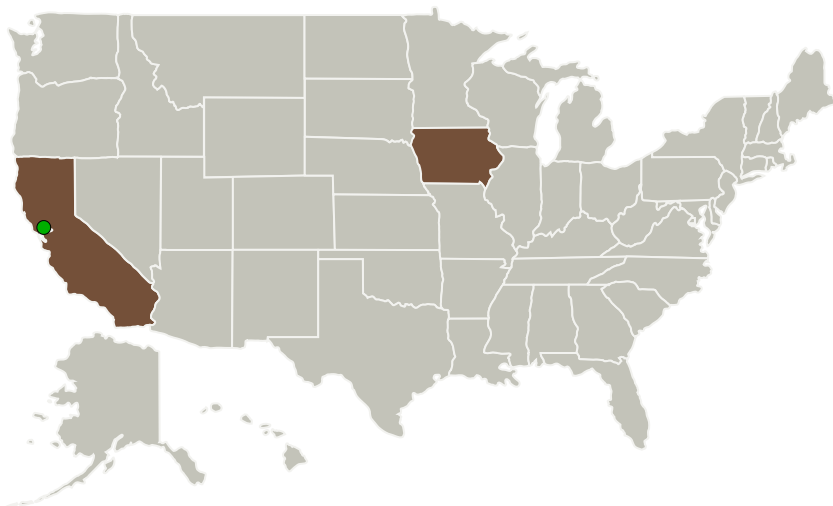


Completed Technology Project (2011 - 2011)

Project Introduction

The incorporation of viscous analysis in design is vital for a complete understanding of aerodynamic problems. This proposal offers to develop and integrate with RotCFD a method for semi-automatically generating grids suitable for viscous analysis on complex configurations as well as parallelize the solver in RotCFD to take advantage of today's multi-core machines. The principle idea behind the semi-automation of the grid generation is to divide the geometry surface into patches and generate body-conforming grids from these patches. This partitioning allows for automatic generation of grids with aspect ratios suitable for viscous flows. Convection dominates the outer region, so unstructured Cartesian meshes can be generated quickly and easily here. The outer grid will be conformed to the inner grid so the entire grid can be treated as one unstructured grid with an unstructured solver, or as a hybrid grid with multiple zones and solvers. In the hybrid approach, viscous solvers can be used for the inner zone while the faster inviscid solvers can be used in the far-field. In Phase I a proof-of-concept grid generator, and a conceptual methodology for solver parallelization will be developed and demonstrated to work with RotCFD the rotor aerodynamic design tool. In Phase II, the features of the grid generator and solver will be fully developed and expanded.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Sukra Helitek Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Ames, Iowa
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California	Iowa
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Project Transitions

**February 2011:** Project Start**September 2011:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140175>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Sukra Helitek Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

R Ganesh Rajagopalan

Co-Investigator:

Andrew Hollingsworth

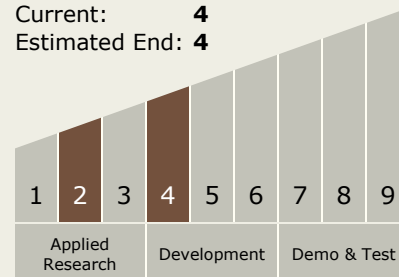
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Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.3 Aeroelasticity

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System